DENBIGH EXPERIMENTAL FOREST

...A Progress Report

Prepared By: Glenn Roloff — 2/19/85

Glenn Roloff
ND Coordinator
Custer National Forest

Date

Approved By: John P. Duncan — 2/27/85

David A. Filius
Forest Supervisor
Custer National Forest

Date

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I. Introduction

In 1983 a contract was signed between the North Dakota Forest Service and the Custer National Forest to perform major project work at Denbigh Experimental Forest. The contract was completed and accepted on December 27, 1984. This progress report describes and illustrates the project work accomplished during that period, provides background material, and discusses the potential for future activities. It was deemed important that the work completed should be documented at this time.

II. Management Responsibilities

Management responsibilities are conducted jointly between the Rocky Mountain Forest and Range Experiment Station's Forestry Sciences Laboratory in Lincoln, Nebraska, and the Northern Region's Custer National Forest. Whereas research studies and signing are the lab's responsibility, the Custer administers land management activities including protection from fire and insects, protection from grazing including fence maintenance, road and trail maintenance and signing, noxious weed control (primarily leafy spurge), and building maintenance. (A residence, garage, and storage shed were built in 1931 and remain in relatively good condition.) In addition, oil and gas and other mineral management is administered by the Custer National Forest.

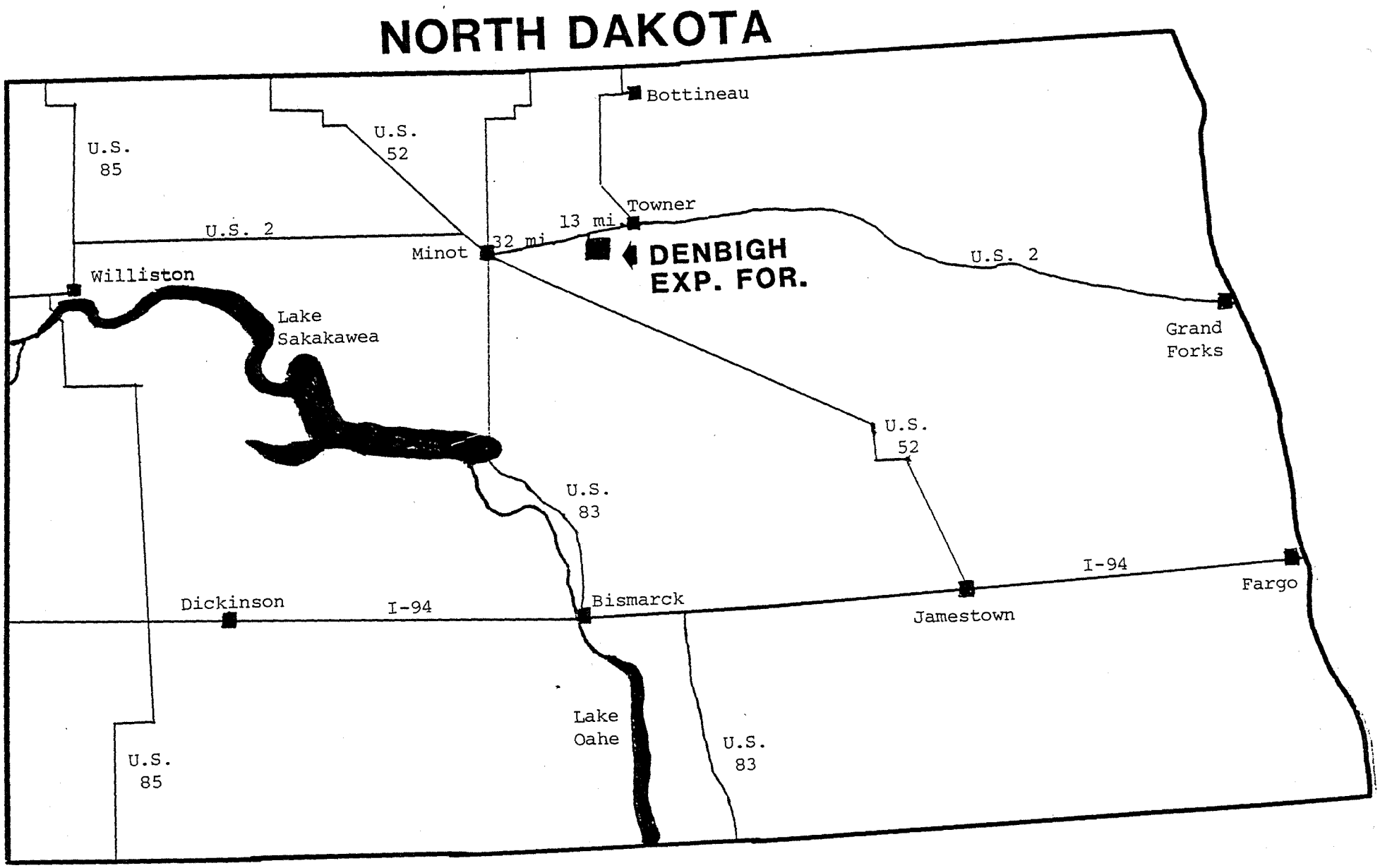
III. Background

To better understand the necessity of the project work involved, it is important to describe the history of Denbigh and the area.

A. History of Denbigh

In 1931, Denbigh Experimental Forest, located 13 miles west of Towner, was established by the Forest Service on a 636 acre section of land (Map 1). Figure 1 depicts the appearance of the area four years after establishment.

Figure 1. 1935 photo of the Residence at Denbigh Experimental Forest.


NORTH DAKOTA
Bottineau
U.S. 85
U.S. 52
Towner
13 mi.
U.S. 2
32 mi.
Minot
DENBIGH EXP. FOR.
U.S. 2
Williston
Lake Sakakawea
Grand Forks
U.S. 52
U.S. 83
I-94
Fargo
Dickinson
I-94
Bismarck
Jamestown
Lake Oahe
U.S. 85
U.S. 83

MAP 1

The Forest Service acquired 40 acres of the total 636 acres at that time, with the State of North Dakota retaining the other 596 acres. In 1971, the USDA-Forest Service acquired this acreage. However, since 1931, the entire section has been managed as one unit for experimental and other purposes. The original purposes for establishment included the following:

(1) Establish various tree species (primarily conifer) to determine which would grow well for subsequent shelterbelt plantings in the northern Great Plains;

(2) Determine which seed sources of these species were most adaptable in the northern Great Plains;

(3) Determine which methods for site preparation, planting, and care of seedlings would be best for shelterbelt purposes.

During the 1930's, 1940's, and 1960's, over 40 tree species from numerous seed sources from New Mexico to Montana, the Lake States, Europe, and Asia, were planted on the experimental area. Some of these species included Scots and Austrian pine, Siberian larch and Russian-olive from Europe and Asia, red and jack pine from the Lake States, and ponderosa pine, Colorado blue spruce, Black Hills spruce, Rocky Mountain juniper, and Douglas-fir from the plains and western states.

B. Proposed Souris National Forest

Economic and drought conditions by 1931 had started to worsen. During that year, key people in McHenry County and State officials petitioned the USDA-Forest Service to study the possibilities of establishing a national forest on the sandy soils of the county, similar to the national forest successfully established previously in the sand hills of Nebraska. An article in the Mouse River Farmers Press dated 10/9/31 stated in part the following:

> "In McHenry County, especially during recent years when cattle raising has been unprofitable, land values have shrunk until the really sandy tracts attract no buyers, and the county itself is burdened with thousands of acres which have reverted to it for non-payment of taxes. The State of North Dakota has also acquired considerable of this land on foreclosed mortgages, although the state land is more largely meadow or tillable land.
>
> It is the nearness of the watertable which has led several public spirited citizens of the state, as well as state and county officials burdened with the problem of disposition of their unprofitable holdings, to believe that forest trees once established upon them would make excellent growth, despite the low rainfall of the region and the occasional occurence of years like the present, when the surface sand becames almost bone dry."

As the study continued to 1935, drought conditions continued to get worse. Much of the sandy soil areas previously cultivated were severely eroding because of the lack of vegetation and moisture, high winds, and high temperatures. Dune areas too rough to cultivate were being overgrazed by cattle and sheep.

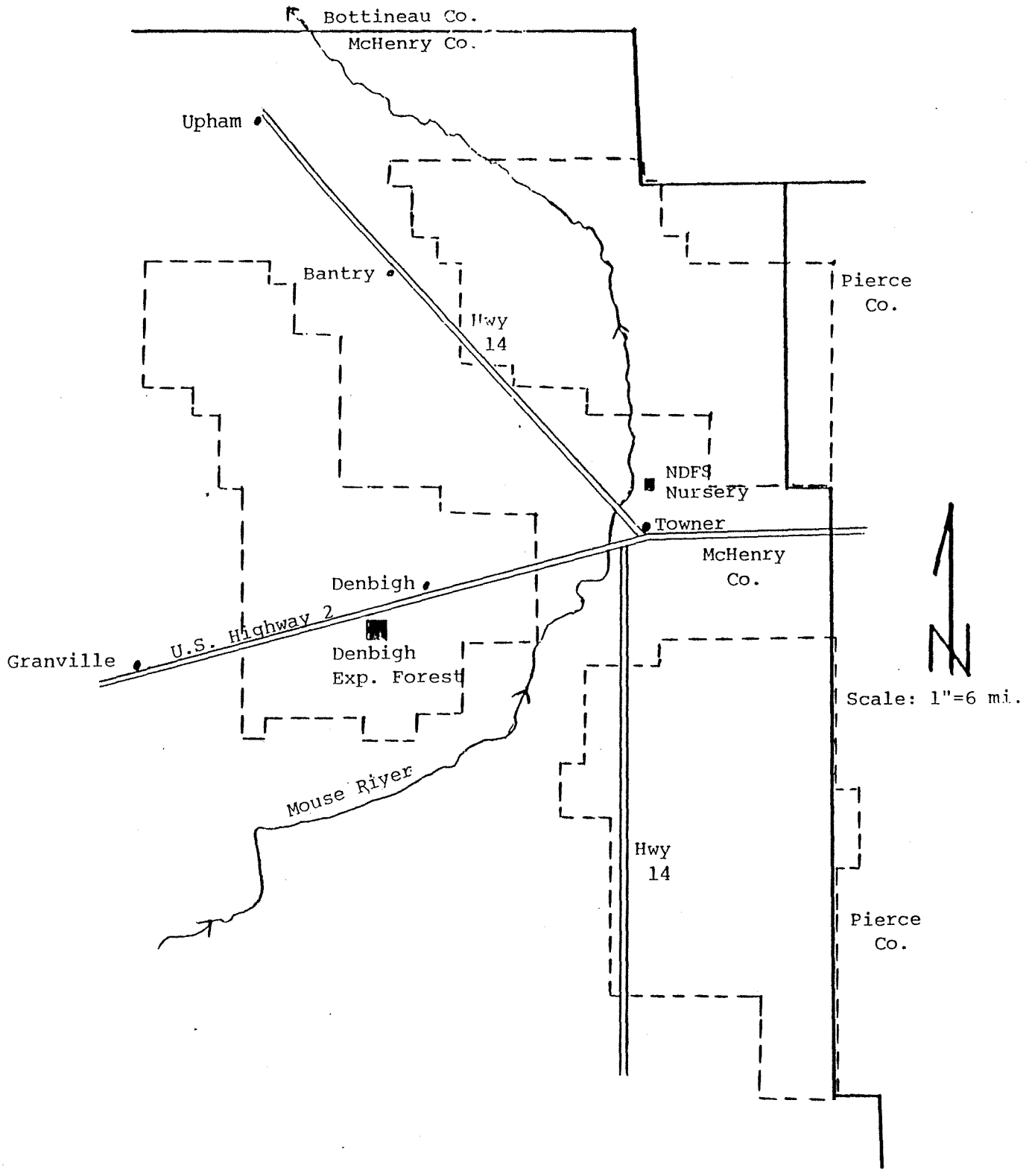
In 1935, the Forest Service announced that the National Forest Reservation Commission had approved the purchase of Souris National Forest. The potential size of the area ranged from 200,000 to 480,000 acres in McHenry County with a small portion extending into Pierce and Bottineau Counties (Map 2). The plan was to plant trees on about 1/3 of the total area and grass on the remainder. These plantings would stabilize the blowing sands and render the land useful for forestry and agricultural purposes in addition to providing recreation and wildlife habitat for big game and upland game. The national forest would remain 1/3 forested, 1/3 for haying, and 1/3 for grazing. It was thought by many people that this establishment of the national forest would help improve the local economy by employing many people for planting and care of the trees, by providing hay for local ranchers, and by allowing grazing on some of the land. However, following 1935, Congress failed to appropriate funds for purchasing these lands during the intervening years and the plan to establish the national forest was eventually dropped.

Also in 1935, the National Forest Reservation Commission approved the purchase by the U.S. Forest Service, of 480 acres two miles north of Towner to establish a nursery for producing the tree seedlings needed for planting the national forest. This land was purchased and the nursery was established that year. It remained in operation until 1942, when it was closed down during World War II. In 1951, the North Dakota Forest Service reopened the nursery and has operated it since that time. In 1971 through a land exchange, the ND Forest Service acquired 320 acres of the land at the nursery from the U.S. Forest Service. It currently produces about 1 1/4 million seedlings each year. The remaining 160 acres was retained by the U.S. Forest Service for research purposes and is known as the Souris Purchase Unit. It and Denbigh Experimental Forest are the only U.S. Forest Service parcels of land in McHenry County, since the Souris National Forest was never acquired.

IV. Past and Present Use

Denbigh is extremely valuable because no other area like this has been established in the northern Great Plains. Currently about 60 percent of the area has been planted. The remainder of the experimental area, primarily in the northeast 1/4 and southeast 1/4, is natural prairie vegetation including several prairie grasses and small clumps of native aspen. In addition, a "natural forty" has been administratively set aside and reserved for botanical studies. The entire experimental area has been fenced since its establishment in 1931. No grazing has been allowed nor have any fires occurred since that time. Except for about 80 acres owned by BLM along the east boundary of the experimental area near the northeast corner, all adjacent ownership is private. All surrounding land is used for cattle grazing.

PROPOSED SOURIS NATIONAL FOREST



Legend

------ Proposed National Forest Boundary

——— County Boundaries

(Redrawn from map-1938 - F.S. report)

MAP 2

A. Research Studies

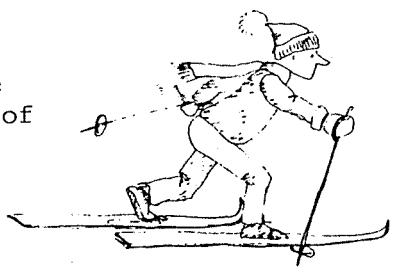
During the past several years, studies have been initiated with the conifer species. Research in genetics for tree improvement is being carried out cooperatively with the USDA-Agricultural Research Service and the North Dakota Forest Service. Characteristics for superior trees being studied include faster growth and increased hardiness.

B. Nursery Seed

Equally as important as the past and current research studies, the experimental area provides nearly all of the conifer seed for the North Dakota Forest Service nursery, located 2 miles north of Towner. The nursery, in turn, provides all of the coniferous seedlings for shelterbelt plantings in North Dakota and part of the seedlings for the neighboring states of Montana, South Dakota, and Minnesota. Each fall the nursery personnel spend several weeks collecting seed for next year's planting. No other significant seed sources for production of some 1 1/4 million seedlings each year exist in North Dakota.

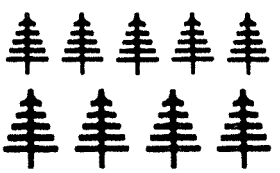
C. Recreation

There are no developed recreation sites located within the experimental area. Dispersed recreation includes hunting of deer and sharp-tail grouse, hiking, berry picking, and cross-country skiing. A hiking trail for viewing the countryside has been established over several large sand dunes in the southwestern part of the area.



D. Arboretum

An arboretum containing about 30 species (primarily conifer) from Europe, Asia, and the U.S. was established during 1940-1942. It is used, along with the rest of the planted area, as an outdoor classroom for students from North Dakota State University-Bottineau Campus.



E. Wildlife

The experimental area is extremely important for wildlife. It provides a variety of food and cover for numerous wildlife species. Over the years, it has become a winter haven for nonmigratory wildlife species, drawing white-tail deer and sharp-tail grouse and other species from a considerable distance--primarily because of the protection the coniferous stands provide from severe winter storms and because of the readily available food sources. During the remainder of the year, the above species and others utilize this excellent

habitat. Raptors, including several hawk and owl species, frequent the area during much of the year. Red fox, squirrels, rabbits, and porcupines are year-round residents of the area. During 1984, sightings of two non-game birds were made that were significant. The pine warbler and the black-backed three-toed woodpecker were observed. Both species occur only in contiguous coniferous stands in their native range. This woodpecker, uncommon in its range, is found in coniferous forests from the U.S.-Canadian border north into Alaska. The fact that contiguous coniferous forests are not found within several hundred miles of Denbigh makes these sightings significant.

F. Minerals

The entire forest has been leased for oil and gas exploration and development; however, no drilling activity has occurred up to this time.

V. Events Leading to the Project

During the 1970's and early 1980's, research funding for Denbigh continued to dwindle to the point that very little project work was being accomplished. Only a small portion of the dense timber stands had been thinned. Seed collection by the North Dakota Forest Service for their nursery at Towner was being hampered because of the dense growth. Leafy spurge was continuing to spread over much of the forest since no chemical control had been accomplished. Informational signs were not being replaced or restored and were continuing to deteriorate. The Skyline Trail was severely eroded and needed attention. The residence, storage shed, and garage were deteriorating. Also, the arboretum had lost some of its value because of dense undergrowth.

In 1982 the Shelterbelt Laboratory at Bottineau was forced to close because of inadequate funding. Dr. Richard Tinus, who was responsible for administration of research programs at Denbigh, was transferred to Flagstaff, Arizona. Mr. James Van Deusen, his associate, retired.

Because of the above situation--which generated concern about the future of Denbigh from North Dakota Forest Service, USDA-Agriculture Research Service and Forest Service personnel--a meeting was held on April 19, 1983 (Figure 2) to discuss possible measures to alleviate it. As a result of that meeting, it was decided by Tom Coston, Regional Forester, to try to secure funds for project work, which was subsequently accomplished.

In May 1983, most of the same group met with Glenn Peterson, Project Leader, Forestry Sciences Lab, Lincoln, Nebraska, who has research responsibilities at Denbigh following the closure of the Shelterbelt Lab. A project work plan was developed, resulting from that meeting.

Figure 2 - April 19, 1983 meeting at Denbigh.

L. to R. - Dr. Richard Cunningham, Geneticist, USDA-ARS; Dr. Robert Johnson, State Forester, NDFS; Tom Coston, Regional Forester, USDA-FS; Jim Mann, Custer Forest Supervisor, USDA-FS; Glenn Roloff, ND Coordinator, Custer NF, USDA-FS; Roy LaFromboise, Nursery Manager, NDFS.
(Not pictured above-Richard Gilmore, Tree Improvement Specialist, NDFS)

On July 7, 1983, a memorandum of understanding was signed between the Rocky Mountain Forest and Range Experiment Station and the Northern Region for administration of Denbigh. It specified the responsibilities of the Forestry Sciences Lab and the Custer National Forest for future management.

The above events and actions culminated in the signing of a $48,000 contract between the North Dakota Forest Service and the Custer National Forest on September 16, 1983 for specified project work. Warren Webster, R-1 Zone Contracting Officer, with assistance from Dean Bassett, Custer Engineering Staff, negotiated the contract with Dr. Robert Johnson, State Forester.

. The Project

The contract included thinning and pruning, tree removal, insect control, leafy spurge control, firebreak construction, slash burning, and general cleanup. In May of 1984, the contract was modified to include building and trail maintenance and road and trail sign renovation, construction, and installation. This modification added $3,488 from Custer National Forest funds to the contract for a total of $51,488.

Personnel having primary involvement in the contract were as follows:

Name	Title	Responsibility
ND Forest Service		
Roy Lafromboise	Nursery Manager	Project supervisor
Richard Gilmore	Tree Improvement Spec.	Tree selection for thinning
Jerome Suchor	Crew Foreman	Supervised 8-person crew for project work
USDA-Forest Service		
Warren Webster	R-1 Zone Cont. Officer	Administered contract
Glenn Roloff	ND Coordinator-Custer NF	Contracting Officer's Rep.
Dean Bassett	Eng. Tech-Custer NF	Prepared contract modification

Table 1 indicates the contract item, including the modification, and the related cost involved.

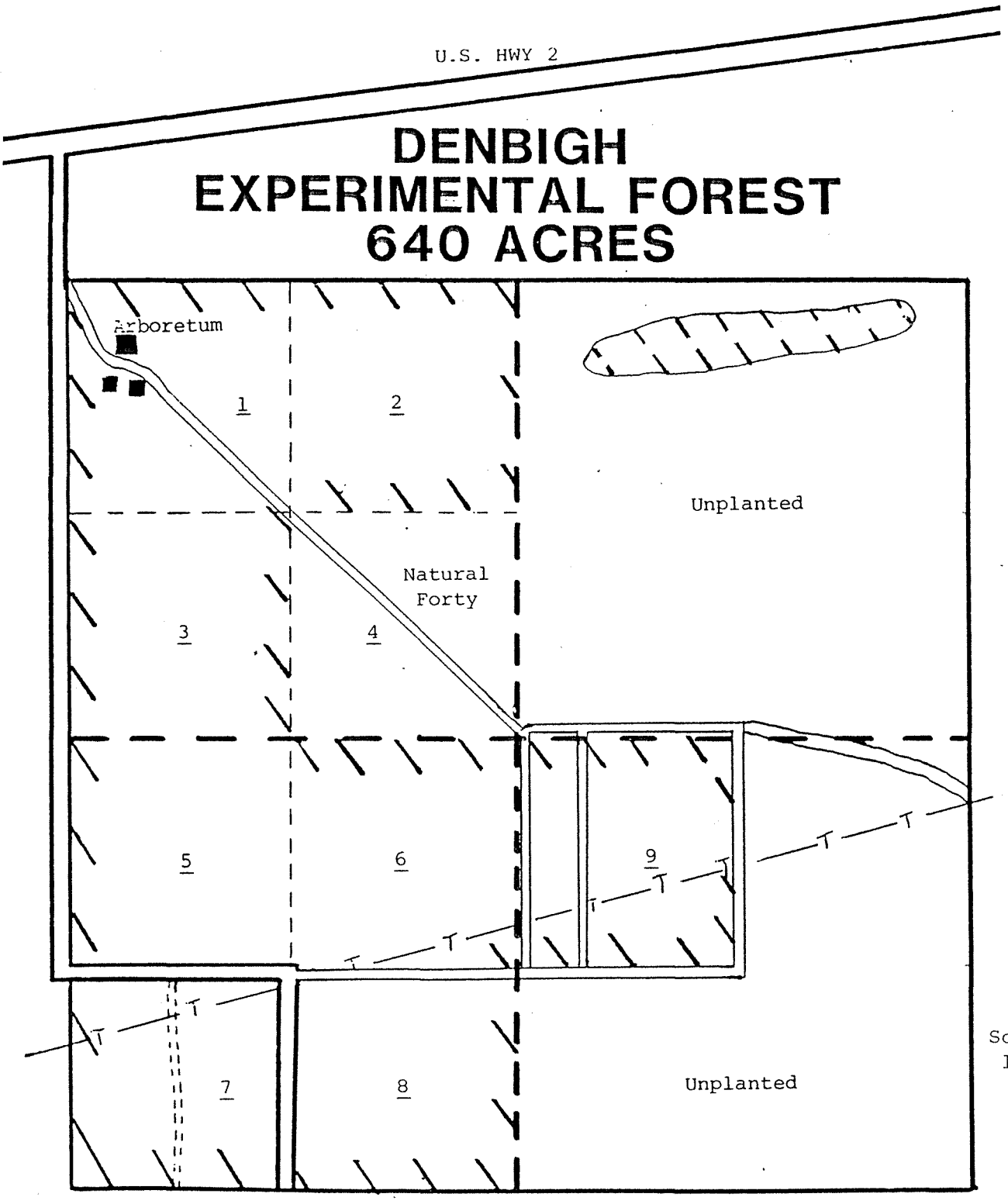
Map 3 indicates the total area planted along with other features. As shown, the western half and one area in the eastern half have been broken into 40-acre areas and have been designated with an area number. These area designations have been used for identifying research at Denbigh for many years. On the following pages each area will be identified where project work was accomplished, along with a description of those tasks and a related map and photographs of the area.

Table 1 - Contract Information

Item No.	Item	Cost
1	Arboretum thinning	$ 3,300.00
2	P7A&B thinning	11,500.00
3	P54A thinning & removal	3,900.00
4	P. Pine thinning area cleanup	6,950.00
5	Tree removal for access	500.00
6	1961 Scots pine pruning	1,250.00
7	1963 Scots pine pruning	2,000.00
8	Leafy spurge spraying	11,170.00
9	Burning and firelines	4,000.00
10	Insect spraying	2,100.00
11	Roadway mowing	730.00
12	General cleanup	600.00
1/ 13	Scots pine removal	-0-
1/ 14	Windbreak thinning & removal	-0-
	Modification No. 1	
1	Residence maintenance	1,115.00
2	Garage maintenance	413.00
3	Storage shed maintenance	860.00
4	Trail maintenance	750.00
2/ 5	Sign installation	350.00
	TOTAL	$51,488.00

1/ These projects were to be accomplished at no expense to the Custer only if time permitted.

2/ The Rocky Mountain Forest and Range Experiment Station purchased the administrative site sign through a transfer of funds to the Custer National Forest.



LEGEND:

Planted Area

Transmission Line

County Road

Unimproved Roads

Foot Trail

MAP 3

A. Area 1

1. Arboretum

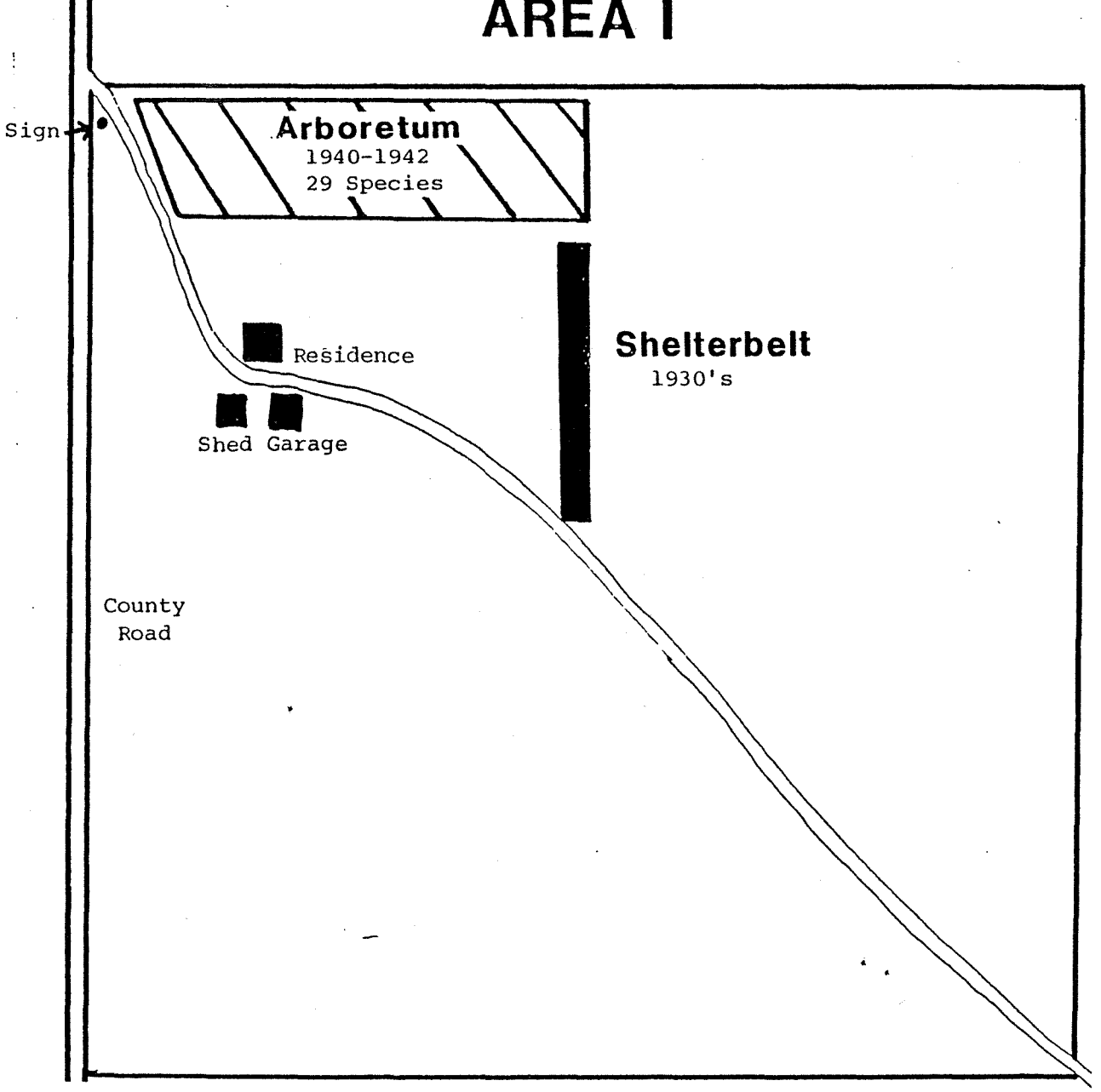
Prior to any project work being accomplished, the arboretum badly needed attention. Trees needed thinning to improve vigor and brush had choked much of the area to the point where it was not very usable any longer for viewing identified tree species. Map 4 indicates the location and description of all work accomplished. Figures 3, 4, 5, and 6 depict the area before, during, and after treatment.

2. Shelterbelt

The shelterbelt was a good potential source of Colorado blue spruce seed for collection, but was inaccessible because of the dense growth of several hardwood species. In addition, the spruce needed to be thinned.

3. Administrative Site

The residence, garage, and shed were built in 1931 and had been deteriorating for several years. After determining that all were structurally sound, it was decided to do limited maintenance for preventing further deterioration. The garage was used by the crew as a work area during all project work at Denbigh. It was also decided that an administrative site sign be installed at the road junction entrance. Figures 7 and 8 depict before and after views of the residence. Figure 9 shows the new sign after being installed.



Arboretum

1. THIN TO PROPER STOCKING LEVEL
2. REMOVE, PILE AND BURN SLASH
3. GENERAL CLEANUP OF DEAD AND DOWN MATERIAL

Shelterbelt

1. REMOVE SIBERIAN ELM, RUSSIAN OLIVE, AND COTTONWOOD
2. THIN COLORADO BLUE SPRUCE
3. PILE AND BURN SLASH

Administrative Site

1. RESIDENCE-PAINT EXTERIOR, REPAIR CHIMNEY, MISC. REPAIRS
2. GARAGE-PAINT EXTERIOR, REPLACE STOVE PIPE
3. SHED-PAINT EXTERIOR, REPAIR DAMAGED ROOF SECTION, INSTALL NEW ROO
4. SIGN-INSTALL AT ENTRANCE

MAP 4

Figure 3 - Before. Looking north from the residence with arboretum in background.

Figure 4 - After. Same view as Figure 3. Note carragana regrowth in left foreground.

Figure 5 - Thinning dense stands in arboretum.

Figure 6 - Removing slash from arboretum for piling and burning.

Figure 7 - Residence before rehabilitation.

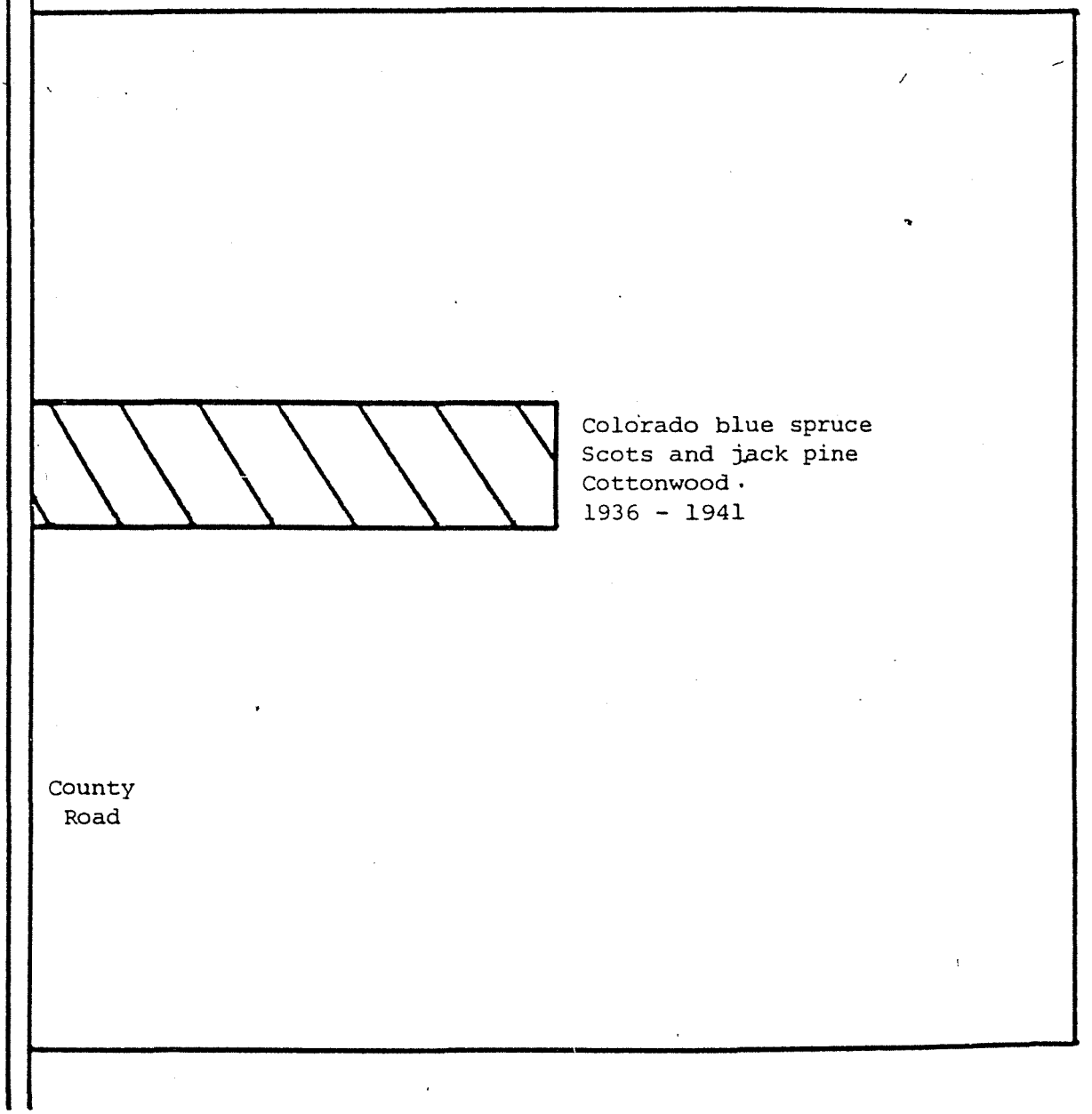
Figure 8 - Residence after rehabilitation.

Figure 9 - New administrative site sign installed at road junction entrance.

B. Area 3

The Colorado blue spruce in the stand shown on Map 5 was a good source of seed for collection; however, access was very difficult because of the dense stand. Also, the Scots and jack pine and cottonwood had deteriorated considerably over the past years. Treatment of the stand is shown on Map 4. Figures 10-13 depict before, during, and after views of the stand.

AREA 3



1. Remove designated cottonwood, Scots and jack pine

2. Thin and prune Colorado blue spruce to provide access

3. Remove, pile and burn slash

MAP 5

Figure 10 - Colorado blue spruce, Scots and jack pine, and cottonwood before treatment.

Figure 11 - Thinning of Colorado blue spruce in same stand as above.

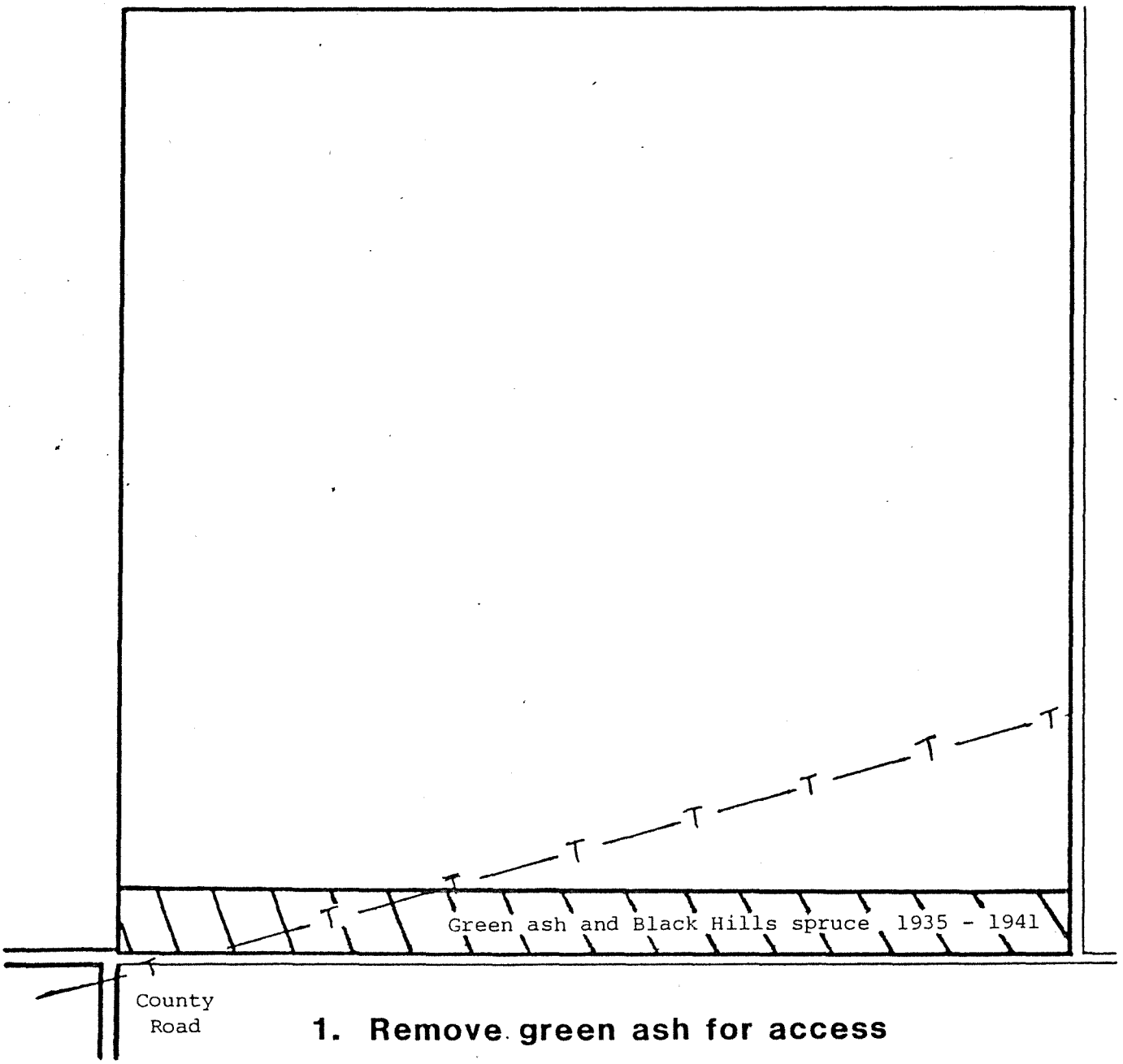
Figure 12 - Tree and slash removal from same stand in Figure 10.

Figure 13 - After treatment. Same stand as shown in Figure 10.

C. Area 6

The Black Hills spruce stand has been a good seed producer for the ND Forest Service nursery. However, access was getting increasingly difficult because of the decadent green ash and the dense stand of spruce. Map 6 indicates the treatment involved in improving this stand. Figures 14 and 15 show views of the stand before and after treatment.

AREA 6



1. **Remove green ash for access**
2. **Thin spruce**
3. **Pile and burn**

Figure 14 - Mixed stand of Black Hills spruce and green ash before treatment.

Figure 15 - Same stand as in Figure 14 after green ash removal and spruce thinning.

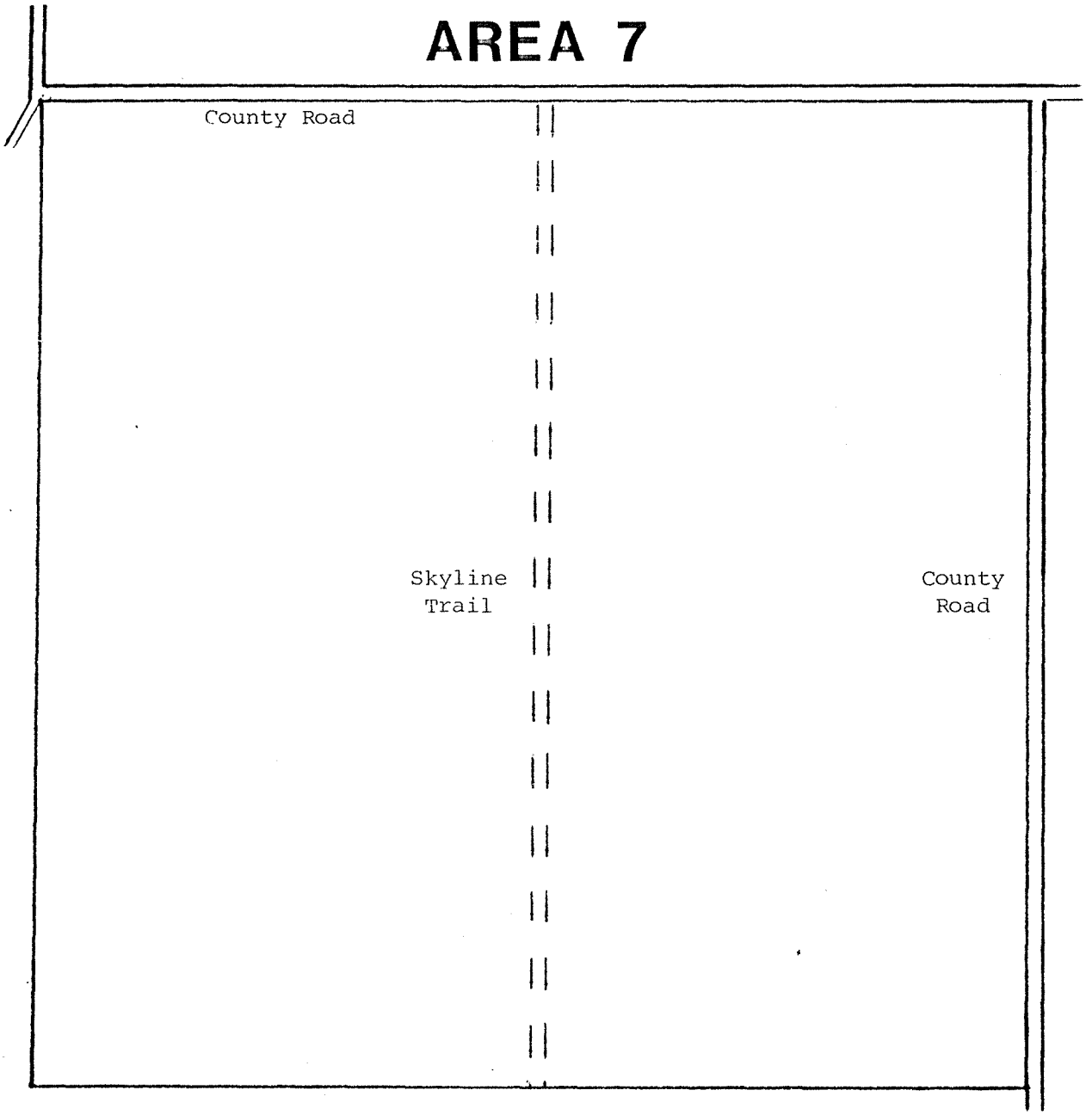
D. Area 7

The Skyline Trail was built a number of years ago over some rather large sand dunes for viewing the surrounding area. Over a period of time, the steeper areas started eroding from foot and horse traffic and finally became quite excessive in some locations. Because of encroaching brush, it was becoming more and more difficult to use the trail. Treatment included installing railroad ties at right angles to the trail in the heavily eroded areas and brushing-out over the entire length of the trail.

In addition, the trail entrance sign and a parking area sign were in poor condition. The entrance sign was refinished and the posts were replaced. The parking sign and post were replaced with new ones.

Map 7 shows the location of the trail and the treatment involved. Figures 16 and 17 show an excessively eroded area on the trail before and after treatment.

AREA 7



Skyline Trail

1. INSTALL RAILROAD TIES TO CORRECT EROSION
2. BRUSH-OUT ALONG TRAIL
3. REFINISH TRAIL ENTRANCE SIGN
4. REPLACE PARKING AREA SIGN

Figure 16 - Skyline Trail showing excessive erosion from foot and horse traffic before treatment.

Figure 17 - Railroad ties were installed to correct excessive erosion. Trail was also brushed-out on both sides.

E. Area 8

1. Ponderosa Pine - 1940 Plantation

This 17-acre pine stand was heavily thinned by personnel from the Shelterbelt Laboratory in early 1982. Funds ran out before the project could be finished, resulting in large accumulations of slash and downed trees over much of the area. The hazard from potential wildfires increased considerably. Red turpentine beetle populations also increased within the plantation, to the point of killing some of the stand and damaging others.

In the spring of 1983, an ice storm caused further damage by snapping the boles of several trees and permanently bending the tops of others.

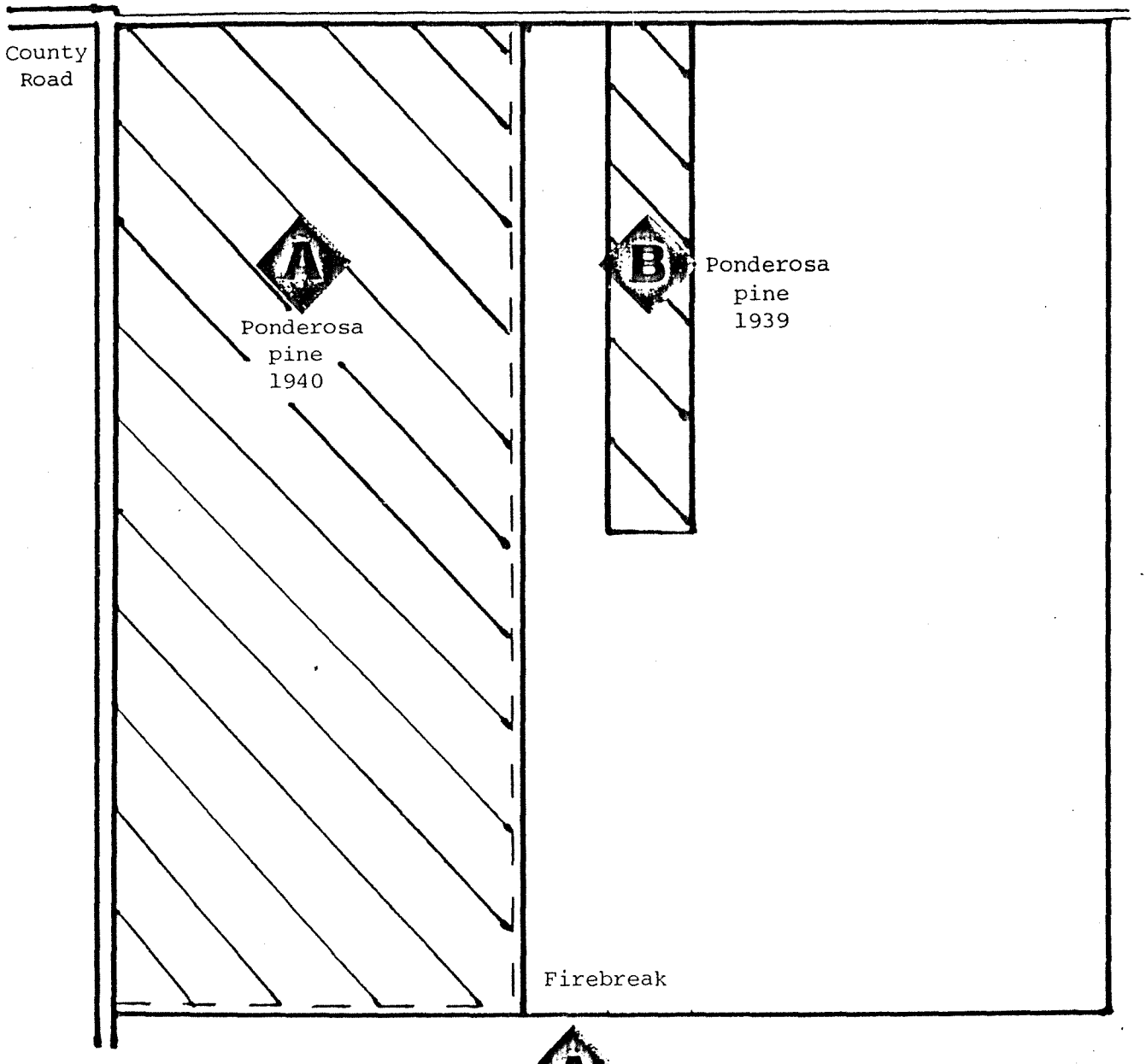
While the stand had good potential for seed collection, it could not be used because of the downed trees and slash.

During development of the project work plan, it was decided to remove and burn all thinned trees and slash, remove ice-damaged and red turpentine beetle-killed trees, flush cut all stumps, spray residual stand with Lindane for beetle control, construct a firebreak, and pile and burn slash (Map 8). Figures 18 and 19 show the slash and ice-damaged trees prior to treatment. Figures 20 and 21 depict the slash removal and resulting slash piles ready for burning. The downed trees were skidded to a large opening to the east of Area 8, along with trees from Area 6, and piled in preparation for burning. Figure 22 is the same view as Figure 21 after slash burning was completed. Figure 23 shows a typical red turpentine beetle infestation within the stand. The newly constructed firebreak located to the south and east of the plantation is shown in Figure 24.

2. Ponderosa Pine - 1939 Plantation

This pine stand was another good source for seed collection purposes, but inaccessible because of a few juniper and native aspen adjacent to it. These trees were removed and skidded to the opening mentioned above for burning.

AREA 8



A

1. REMOVE 1982 THINNED TREES AND SLASH
2. REMOVE ICE-DAMAGED TREES
3. FLUSH-CUT ALL STUMPS
4. CONSTRUCT FIREBREAK
5. PILE AND BURN SLASH
6. SPRAY TREES - RED TURPENTINE BEETLE

B

1. REMOVE ASPEN AND JUNIPER TREES FOR ACCESS
2. PILE AND BURN SLASH

MAP 8

Figure 18 - Ponderosa pine planted in 1940 and thinned in early 1982 with slash residual.

Figure 19 - Same stand as above showing spring 1983 ice storm damaged boles.

Figure 20 - Slash removal in 1940 ponderosa pine stand.

Figure 21 - Slash piles ready for burning along county road after removal from 1940 ponderosa pine stand.

Figure 22 - Same view as Figure 21 after slash burning was completed.

Figure 23 - Red turpentine beetle infestation in 1940 ponderosa pine stand.

Figure 24 - Completed firebreak adjacent to 1940 ponderosa pine stand.

F. Area 9

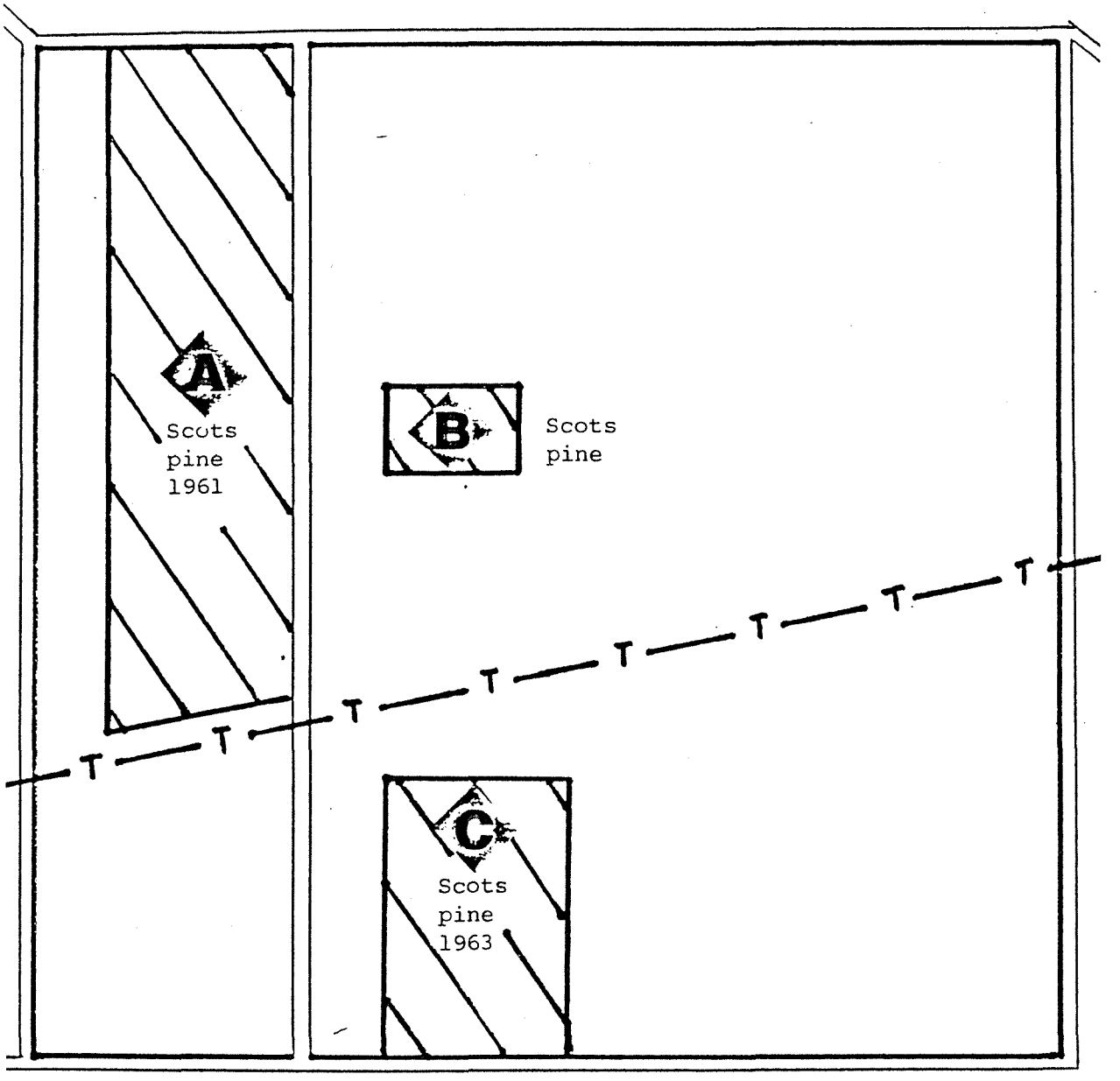
1. Scots Pine 1961 and 1963 Seed Orchards

These seed orchards are the most intensively managed stands at Denbigh. They have been thinned several times, with the last thinning occurring in 1982. Red turpentine beetle populations have infested several trees in both stands. Ice damage in early 1983 broke some tops and major limbs. These stands have been a major source for seed collection by the North Dakota Forest Service nursery. Map 9 shows the location and treatment prescribed for these stands, which included pruning of ice-damaged material, removing and burning slash, and spraying insect infestations. Figures 25-27 show examination, pruning, and spraying of these stands.

2. Small Scots Pine Plantation

This 1-acre plantation was in poor condition because of porcupine and insect damage. In addition, pollen from these trees was contaminating the 1961 Scots pine seed orchard. It was decided to eliminate this stand for the above reasons. It was subsequently dozed, piled and burned as shown in Figures 28 and 29.

AREA 9



A

1. PRUNE ICE-DAMAGED TREES
2. REMOVE, PILE AND BURN SLASH
3. BURN 1982 THINNING SLASH
4. SPRAY TREES - RED TURPENTINE BEETLE

B

1. REMOVE ENTIRE STAND
2. PILE AND BURN SLASH

C

1. PRUNE ICE-DAMAGED TREES
2. REMOVE, PILE AND BURN SLASH
3. SPRAY TREES - RED TURPENTINE BEETLE

MAP 9

Figure 25 - Oscar Dooling, R-1 Plant Pathologist, and Scott Tunnock, R-1 Entomologist, examining 1961 Scots pine seed orchard. Note leafy spurge in foreground.

Figure 26 - Pruning of ice-damaged material in 1961 Scots pine seed orchard.

Figure 27 - Lindane spraying of red turpentine beetle infestations in 1963 Scots pine seed orchard.

Figure 28 - Removal of small Scots pine plantation to prevent further pollen contamination of the 1961 Scots pine seed orchard.

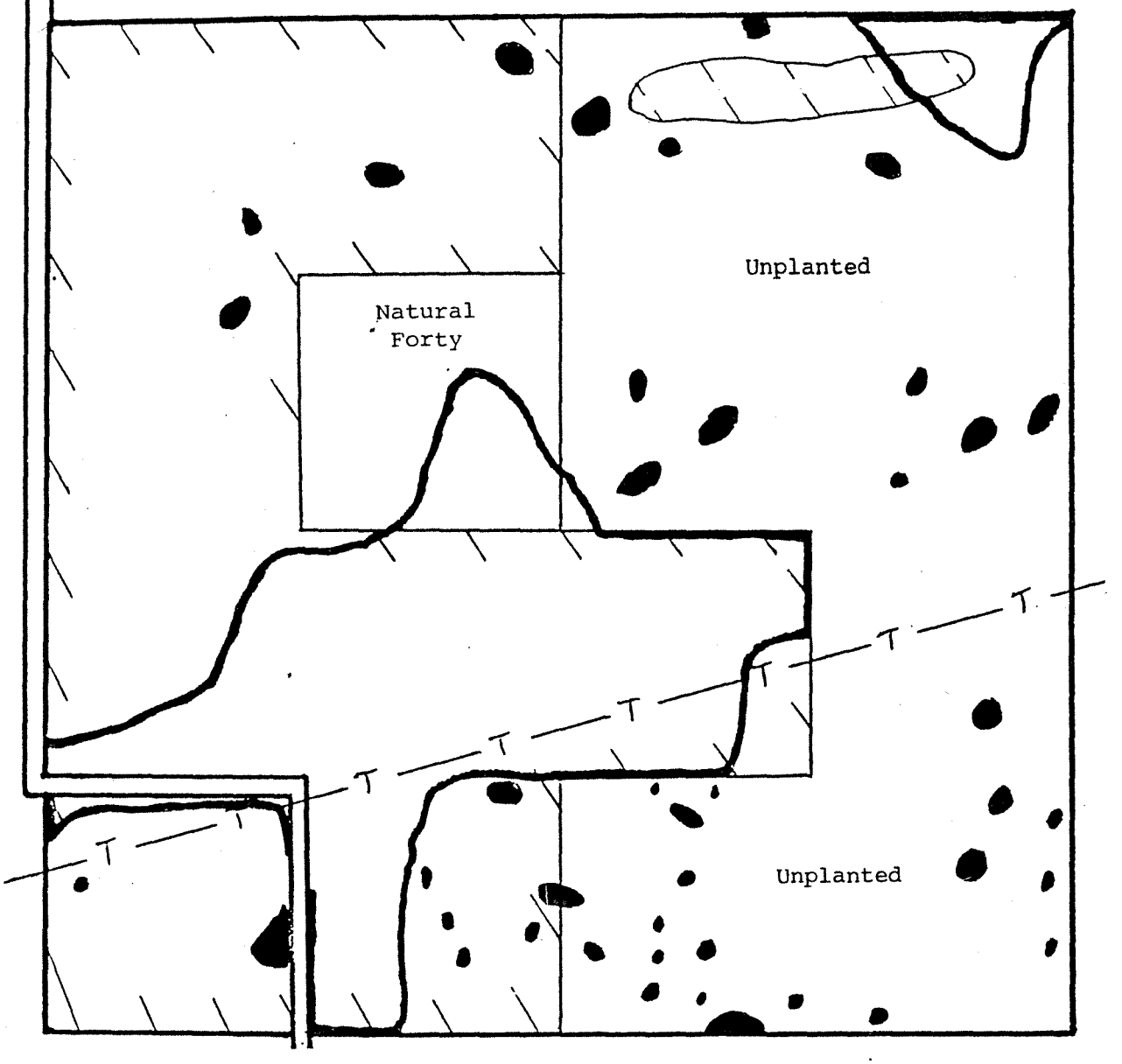
Figure 29 - Same area as above ready for burning.

G. Leafy Spurge Control

Leafy spurge has continued to spread throughout much of Denbigh over the past several years. No control activities had occurred prior to the project. Map 10 indicates the areal extent of this range pest. As shown, it is found both in the various plantations and in the prairie grass areas. The 1983 North Dakota Legislature strengthened the existing weed control law. McHenry County has a severe problem with this weed and the county weed board has been trying to at least reduce the rate of spread within the past two years.

It was decided that control measures at Denbigh would hopefully contain the spurge and possibly reduce the acreage of infestation, including all known patches adjacent to the ownership boundary. Map 9 also indicates the chemicals used and rates of application for planted and unplanted areas. Hand held battery operated "Herbie" applicators were used under the trees. In the open areas, a truck mounted sprayer was used. All known infestations were sprayed. Following treatment, the county weed board was notified of the control project. Figure 30 depicts a leafy spurge infestation near the 1961 Scots pine seed orchard in Area 9. The estimated total for areas treated was approximately 240 acres.

LEAFY SPURGE



TREATMENT:

1. OPEN AREAS: SPRAY TORDON 22K
   AND 2,4-D (¼ LB. & 1 LB./ACRE)

2. PLANTED AREAS: SPRAY 2,4-D
   (2 LB./ACRE)

LEGEND:

Spurge

Planted

MAP 10

Figure 30 - A leafy spurge infestation located directly east of the 1961 Scots pine seed orchard in Area 9.

H. Slash Burning

In October of 1983, Wayne Smetanka, Custer National Forest Fire Staff Officer (Figure 31) prepared a burning plan for directing all slash burning activities. It included construction of firebreaks around each major slash pile, locating piles away from live trees, burning under snow conditions, and burning during periods of little or no wind.

Seven major slash piles were established, resulting from tree removals and thinnings in Areas 1, 3, 6, 8, and 9 (Figure 32). In addition, there were numerous small piles of light slash established along the county road adjacent to the 1940 ponderosa pine plantation in Area 8. The slash from the 1982 thinnings was burned in November of 1983. Slash from tree removal and thinning activities in late 1983 and early 1984 dried for nearly one year before being burned in December of 1984.

Prior to burning operations in 1983 and 1984, the North Dakota Department of Health's Environmental Engineering Division was contacted and approval was granted by that agency for slash burning activities. Shortly before burning each year, the Towner Fire Department and adjacent landowners were notified.

Also prior to burning, wood cutting in the piles was encouraged by generating news articles in the McHenry County newspaper and the Minot Daily News. Wood cutting signs were placed along the county road and interior roads directing people to the slash piles. Large amounts of wood were removed for home fuelwood use (Figure 33).

Burning activities both years were quite successful as indicated in Figures 34-37.

Figure 31 - Wayne Smetanka, Custer NF Fire Staff Officer checking moisture content of log prior to preparation of project burning plan.

Figure 32 - Slash from Areas 6 and 8. Note Siberian larch in right background.

Figure 33 - Local people and persons from Minot cut firewood from the various slash piles.

Figure 34 - Tom Karch, NDFS District Forester, starting to burn a slash pile during snowfall.

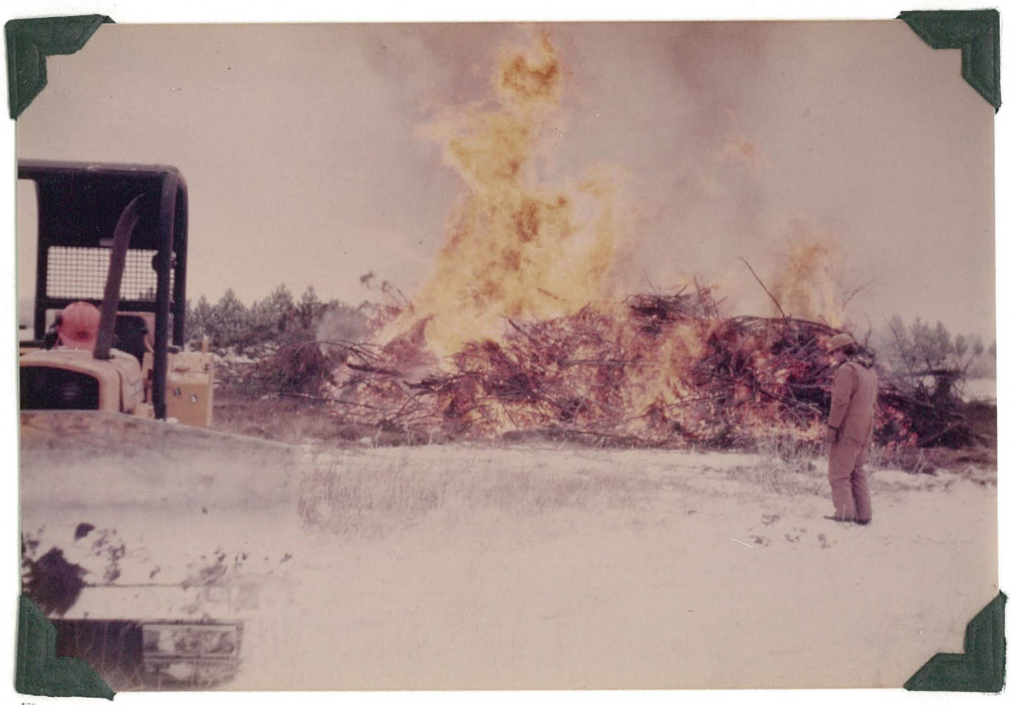


Figure 35 - Jerome Suchor, NDFS Crew Foreman, with slash burning in progress.

Figure 36 - Same pile as in Figure 35 later that day.

Figure 37 - Same view as Figure 36 following a complete burn.

I. Project Summary and Evaluation

Following are the major contract components accomplished during the project:

(1)	Tree removal, thinning, and pruning	36 acres
(2)	Insect control	30 acres
(3)	Leafy spurge control	240 acres
(4)	Building maintenance and repair	3 buildings
(5)	Sign construction, renovation, and installation	3 signs
(6)	Trail maintenance and rehabilitation	0.25 mile
(7)	Slash piling and burning	7 piles
(8)	Firebreak construction	0.4 mile

All planned project work was accomplished in a timely manner and exceeded quality and quantities specified in the contract. It resulted from a highly cooperative spirit between the two agencies in conducting this mutually beneficial project and from the professionalism of all personnel involved.

VII. The Future

On October 10, 1984, the Custer National Forest entered into a maintenance agreement with the North Dakota Forest Service for FY 1985. It was decided, now that the major project has been completed, that a yearly maintenance agreement would be undertaken each year to continue minimal maintenance for preventing deterioration, providing funds are available. The 1985 agreement includes the following components:

1. Firebreak maintenance	$ 600
2. Fence maintenance	1,000
3. Leafy spurge control	1,000
4. Trail maintenance	150
5. Road and ditch maintenance	950
6. Building maintenance	425
TOTAL	$4,125

Each year the agreement will be prepared to fit current needs related to the Custer National Forest's responsibility and budgetary constraints.

In May of 1985, a meeting is planned between Forestry Sciences Lab, Custer National Forest, and other cooperating agencies' personnel to develop a 5-year activity schedule for research and land management activities. In accordance with the memorandum of understanding between the Rocky Mountain Station and Region 1, an annual meeting is to take place between the above units to review and discuss general work plans for the upcoming season. However, it was deemed necessary to discuss both 1-year and 5-year plans. By developing a 5-year activity schedule, it may be possible to schedule projects through the longer range budgeting process. For instance, by incorporating activities in the budgeting process, it may be possible for R-1 to secure funding for tree improvement and other thinning projects on a programmed basis. At the present time, there are several stands that are much too dense that badly need thinning. These programmed thinnings should be tied to a multi-year activity schedule. Needs for other activities could be addressed on the same basis. Another example is signing needs. In 1984, a sign inventory and plan was completed for all signs at Denbigh. Possibly over a period of years, these signs could be replaced or resurfaced on a programmed basis.

During the summer of 1985, the North Dakota Highway Department will begin construction of two additional lanes on Highway 2 in that segment adjacent to Denbigh. The strip of Colorado blue spruce along the highway will be removed during construction. The routed wood Denbigh sign and the directional sign along the highway must be removed. The Custer National Forest has made arrangements with the North Dakota Forest Service to remove these signs. After highway construction is completed, only standard green and white metal highway signs will be allowed. The Custer National Forest will fund the placement of new directional highway signs by the North Dakota Highway Department's contractor.

During the fall of 1984, limited turpentine beetle infestations were found in scattered areas considerable distance away from project thinned stands. An evaluation needs to be undertaken.

In August of 1984, the Custer National Forest, through a contractor, drilled a new water well near the residence. This well is capable of supplying large quantities of potable water for future project work activities.

The North Dakota Office of Nature Conservancy is extremely interested in starting an ornithological study at Denbigh--possibly by the University of North Dakota's Biology Department--because of the 1984 sightings of two unique species of nongame birds previously mentioned in this report.

The draft Forest Plan for the Custer National Forest, which includes Denbigh Experimental Forest and the Souris Purchase Unit, is to be released for public review in late March 1985. It contains long-range management direction for all units including Denbigh and Souris.

In conclusion, it will be very important to incorporate as many necessary and desirable activities as possible in the yearly and multi-year schedules on a planned basis related to the overall direction from the Forest Plan.

FY 1985 Accomplishments
Denbigh Experimental Forest

Through a maintenance agreement dated 10/10/84 between the Custer National Forest and the ND Forest Service, the following were accomplished by Roy Lafromboise, Nursery Manager, ND Forest Service, and his personnel:

1. Fire Maintenance

   a. maintained all firebreaks
   b. labor - 5 man days

2. Fence Maintenance

   a. removed dead and down trees along fence line
   b. repaired 2 miles along south and east boundary
   c. used 75 steel posts and 40 rods of wire
   d. labor - 16 man days

3. Leafy Spurge Control

   a. sprayed 22 acres in open areas and 10 acres in trees
   b. rate - 2 qts. 2,4-D + 1 qt. Tordon/100 gal. water (open areas)
      - 2 qts. 2,4-D/100 gal. water (tree areas)
   c. volume - 10½ gal. 2,4-D + 5½ gal. Tordon (open areas)
      - 5 gal. 2,4-D (tree areas)
   d. labor - 20 man days

4. Trail Maintenance

   a. replaced tread and re-set timbers in eroded areas
   b. labor - 3 man days

5. Road Maintenance

   a. bladed 3 miles interior roads with motor grader
   b. labor - 5 man days

6. Ditch Maintenance

   a. mowed 4 miles (Denbigh and Souris P.U.)
   b. mowed seed collection areas
   c. labor - 7 man days

7. Building and Grounds Maintenance

a. mowed administrative site and arboretum 4 times each
b. cut and removed storm-damaged trees and branches
c. labor - 10 man days

8. Red Turpentine Beetle Control

a. sprayed 200 ponderosa, jack, and Scots pine with Lindane
b. rate - 1 gal./20 gal. water
c. volume - 5 gal.
d. labor - 2 man days (survey) and 12 man days (spraying)

9. Signs

a. removed old signs along U.S. Highway 2
b. constructed and erected 2 signs
"No Horses Permitted," "No Fires Permitted"
c. labor - 2 man days

FY 1986 Accomplishments
Denbigh Experimental Forest

A. Through a maintenance agreement dated November 18, 1985 between the Custer National Forest and the North Dakota Forest Service, the following were accomplished by Roy Lafromboise, Nursery Manager, North Dakota Forest Service, and his personnel:

1. Fire Maintenance

   a. maintained all firebreaks
   b. labor - 3 man days

2. Fence Maintenance

   a. removed dead and down trees along fence line
   b. repaired 200 feet in northeast corner
   c. used 10 steel posts
   d. labor - 2 man days

3. Leafy Spurge Control

   a. sprayed 20 acres in open areas and 4 acres in trees
   b. rate - 2 qts. 2,4-D + 1 qt. Tordon/100 gal. water (open areas)
      - 2 qts. 2,4-D/100 gal. water (tree areas)
   c. volume - 12 gal. 2,4-D + 5 gal. Tordon
   d. labor - 26 man days

4. Trail Maintenance

   a. replaced tread and re-set timbers in eroded areas
   b. labor - 4 man days

5. Ditch Maintenance

   a. mowed 4 miles (Denbigh and Souris P.U.)
   b. mowed seed collection areas
   c. labor - 7 man days

6. Building and Grounds Maintenance

   a. mowed and trimmed administrative site and arboretum 3 times each
   b. cut and removed storm-damaged trees and branches
   c. replaced broken windows
   d. cleaned residence and shop
   e. expanded metal collars on 1961 Scots pine
   f. labor - 24 man days

7. Red Turpentine Beetle Control

a. sprayed 160 ponderosa, jack, and Scots pine with Lindane
b. rate - 1 gal./20 gal. water
c. volume - 4 gal.
d. labor - 10 man days

8. Signs

a. repainted 5 signs and replaced posts
b. labor - 4 man days

Subtotal $4,125

B. Based on a sign inventory and plan prepared October 3, 1984, the Rocky Mountain Forest and Range Experiment Station funded the replacement of all wooden signs. The North Dakota Forest Service constructed and installed them.

1. constructed and installed 32 arboretum and 30 other redwood routed and stained signs.
2. restored, restained, and reinstalled large redwood arboretum entrance sign.

Subtotal $2,208

C. The Rocky Mountain Forest and Range Experiment Station funded the reroofing of the residence and shop by a private contractor.

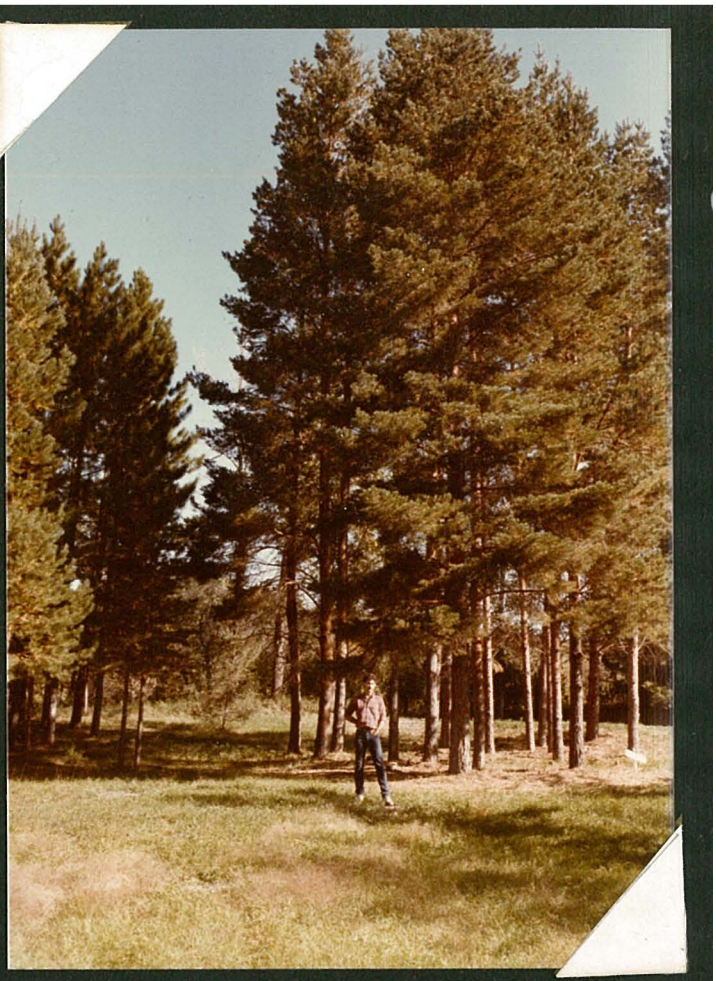
Subtotal $3,036

D. Because of upgrading U.S. Highway 2 from two to four lanes, the large routed entrance sign had to be removed. The Custer National Forest funded the purchase and installation of two standard highway directional signs through an agreement with the North Dakota State Highway Department and installed by the private surfacing contractor.

Subtotal $1,130

Total FY 1986 Costs $10,499

JOSEPH H. STOECKELER
ARBORETUM

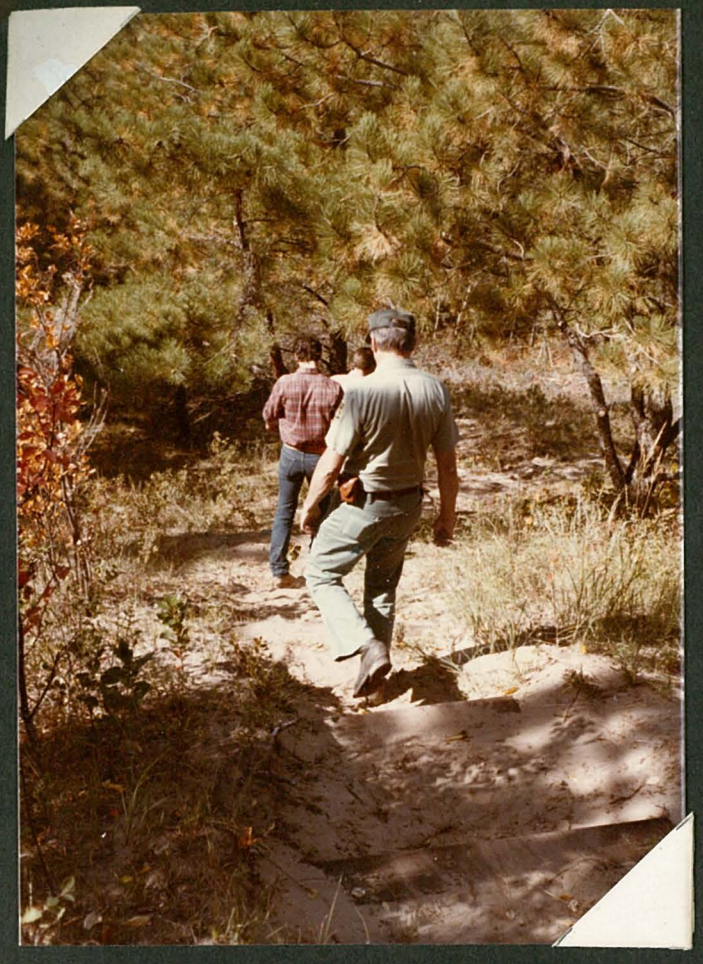


FIREWOOD
REMOVE WOOD
FROM PILES ONLY

DENBIGH
EXPERIMENTAL FOREST
ROCKY MOUNTAIN FOREST
AND RANGE EXPERIMENT STATION

ROCKY MOUNTAIN
FOREST AND RANGE
«EXPERIMENT»
STATION
DENBIGH
EXPERIMENTAL FOREST

G11254



HIKE THE SKYLINE TRAIL
FOR VIEW OF PLANTATIONS

United States Department of Agriculture | Forest Service | NDC

Reply to: 5400 Landownership

Date: November 26, 1986

Subject: Denbigh Experimental Forest

To: Forest Supervisor

Enclosed are the FY 1986 accomplishments through our maintenance agreement with the North Dakota Forest Service and through funds provided by the Rocky Mountain Forest and Range Experiment Station. All work accomplished was done quite well and on a timely basis.

Please insert this report at the back of the February 1985 "Denbigh Experimental Forest--A Progress Report."

Glenn

GLENN ROLOFF
ND Coordinator

cc:
James Overbay, Regional Forester
Charles Loveless, Station Director, Rocky Mtn. Sta.
Larry Kotchman, Acting State Forester, NDFS
Roy Lafromboise, Nursery Manager, NDFS
Dean Bassett, Supervisor's Office
Glenn Peterson, Project Leader, Rocky Mtn. Sta.
(w/enclosure)

United States Department of Agriculture | Forest Service | NDC

Glenn Peterson
Lincoln

Reply to: 5400 Landownership

Date: January 9, 1986

Subject: Denbigh Experimental Forest

To: Forest Supervisor

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Please insert this report at the back of the February 1985 "Denbigh Experimental Forest--A Progress Report."

Glenn

GLENN ROLOFF
ND Coordinator

enclosure

DO
Director
Deputy Director
RSS AD
~~Research AD (Fasick)~~ CS
Research AD (Wicker)
P&A AD
~~Glenn Peterson~~
cc to cc Glenn Peterson mjp 2/7/86
return to

cc:
James Overbay, Regional Forester
Charles Loveless, Station Director, Rocky Mtn. Sta.
Dr. Robert Johnson, State Forester, NDFS
Roy Lafromboise, Nursery Manager, NDFS
Dean Bassett, Supervisor's Office
Glenn Peterson, Project Leader, Rocky Mtn. Sta.
(w/enclosure)

FY 1985 Accomplishments
Denbigh Experimental Forest

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      - 2 qts. 2,4-D/100 gal. water (tree areas)
   c. volume - 10½ gal. 2,4-D + 5½ gal. Tordon (open areas)
      - 5 gal. 2,4-D (tree areas)
   d. labor - 20 man days

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   a. replaced tread and re-set timbers in eroded areas
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